MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Maintenance of Refrigeration & Air Conditioning Systems**		**Module Delivery**		
Module Type	**Core**		☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**		
Module Code	**RAC 303**				
ECTS Credits	**8**				
SWL (hr/sem)	**200**				
Module Level	1		**Semester of Delivery**	6	
Administering Department	PM		**College**	TEMO	
Module Leader	Suhab Hassan Prepared by Bahgat hassan		**e-mail**	ntu.edu.iq	
Module Leader's Acad. Title	.subject Lecturer		**Module Leader's Qualification**	M.Sc.	
Module Tutor	Name (if available)		**e-mail**	Sohaib.hassan.1983@ntu.edu.iq	
Peer Reviewer Name	Name		**e-mail**	E-mail	
Scientific Committee Approval Date	01/06/2023		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	1. **The student recognizes the necessary experience to operate**. 2. **The student recognizes the necessary experience to operate maintenance of Heating Ventilating**) 3. **The student recognizes the necessary experience to operate Air Conditioning equipment.** 4. **The student recognizes the necessary experience from theoretical and practical lectures**
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Important: Write at least 6 Learning Outcomes, better to be equal to the number of study weeks. 2. Knowledge of all public and public safety laws, regulations, legislation, and rules. 3. The ability to know and use refrigeration and air conditioning tools and equipment in the correct and safe manner. 4. The ability to solve problems related to refrigeration and air conditioning systems 5. Full understanding of refrigeration and air conditioning systems, and the ability to install, maintain, and repair them.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. <u>Part A -</u> Introduction to tool, material and instrument, external maintenance and charging domestic refrigerator, electrical circuit of window air condition, maintenance Automobile air conditioning**,** Split units. [15hrs] Maintenance of fans, inspection of fan-coil unit, Maintenance of reciprocating cooling water equipment, Maintenance of centrifugal cooling water equipment , Maintenance of the tower packages [15 hrs] Maintenance of water pumps Maintenance of the boiler, Maintenance of air washer units [10 hrs] Practical visitation to workshop of domestic cooling equipment**.** [6hrs] <u>Part B –</u> Fundamentals . To understand inspection of the electrical components,, cleaning of the tower, Maintenance of mixing boxes [15 hrs] Remote Split units, inspection, operation, maintenance, Different inspections on electrical circuit for automobile air conditioning equipment, Replacing the components of window air-conditioner [7 hrs]

	maintenance of electrical circuits, installing with domestic equipment, evacuating and charging [15 hrs]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Type something like: The major approach used to offer this module will be to promote student engagement in the exercises while also enhancing and broadening their critical thinking abilities. This will be accomplished through lectures, interactive tutorials, and the consideration of various sorts of easy experiments incorporating some engaging sampling exercises for the students.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ أسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	78	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	122	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	8
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**200**		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	10% (10)	3 and 12	LO #1, #2 and #10, #11
	Assignments	-	10% (10)	2 and 12	LO #3, #4 and #6, #7
	Projects / Lab.	3	20% (20)	Continuous	All
	Report				
Summative assessment	**Midterm Exam**	3hr	10% (10)	7	LO #1 - #7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Tools, materials and instruments employed for inspection and measurement
Week 2	Maintenance of domestic refrigerator
Week 3	Water cooler, electrical and mechanical circuits, maintenance of electrical circuits, installing with domestic equipment.
Week 4	Windows air-conditioner, mechanical components, maintenance of electrical circuit.
Week 5	Automobile air conditioning equipment, cleaning and maintenance
Week 6	Split units (single phase and three phases), mechanical components, maintenance and replacing mechanical components
Week 7	Maintenance of fans, fan motors and heating and cooling coils, filters and maintenance of air handling equipment
Week 8	Maintenance of reciprocating cooling water equipment that used reciprocating for air conditioning purposes.
Week 9	Maintenance of absorption refrigeration equipment.
Week 10	Inspection of electrical circuit, cleaning of contact points for conductors, inspection and regulation of controls.
Week 11	Maintenance of the tower packages, replacing the circulation packages, replacing belts, justice belts and cleaning the water
Week 12	Maintenance of water pumps,disassembly of pump and maintenance of internal components, maintenance of electrical motor.
Week 13	Maintenance all parts of central air g conditioning equipment (starter, cleaning of shields, increasing the current for each motor).
Week 14	Maintenance of air washer units and evaporative cooling units
Week 15	Practical visitation to workshop of domestic cooling equipment.

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Maintenance of domestic refrigerator
Week 2	Maintenance of Windows air-conditioner
Week 3	Maintenance of Automobile air conditioning equipment
Week 4	Maintenance of fans
Week 5	Maintenance of the cooling tower
Week 6	Maintenance of Split units
Week 7	Maintenance of air washer units

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	HVAC and Refrigeration Preventive Maintenance 1st Edition	No
Recommended Texts	Fundamentals 0f engineering thermodynamics, Michael J. Moran and Howard N. Shapiro, Fifth adition	No
Websites		

Grading Scheme مخطط الدرجات				
Group	**Grade**	التقدير	**Marks %**	**Definition**
Success Group (50 - 100)	**A** – Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C – Good	جيد	70 - 79	Sound work with notable errors
	D – Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E – Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX** – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

Code	Course/Module Title	ECTS	Semester
RAC 303	Maintenance of Refrigeration & Air Conditioning Systems	8	6
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	3	78	122
Description			
A course on Maintenance of Refrigeration & Air Conditioning Systems s the following sections: 1. Introducing students to defined the tools, materials and instruments 2. To understand the Maintenance of domestic refrigerator 3. To help the student to maintenance Windows air-conditioner 4. To explain to maintenance disassembly compressor of automobile air conditioning equipment 5. To maintenance Remote Split units 6 To maintenance fans of motors 7. Maintenance of water pumps 8 To explain the student to clean and Maintenance of cooling towers			